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10/784,932	02/25/2004	Kazuo Nakajima	249420US2	9577

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EXAMINER
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DIAMOND, ALAN D

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 07/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/784,932

Applicant(s)

NAKAJIMA ET AL.

Examiner

Alan Diamond

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 05192004, 08252004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: reference sign 40 (see page 10, line 11, of the specification). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to because the backslash lines in Figure 9, i.e., the "/" should each be changed to a "1" (see page 17, line 7, of the specification). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and

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where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 5, 8, 12, 14, and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 5, 8, and 15 provide for the use of the multi-element polycrystal, but, since the claims do not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claims 5, 8, and 15 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process

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claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim 12 is indefinite because "said X" at lines 1-2 lacks positive antecedent support in claim 9.

Claim 14 is indefinite because "the elements C, D and E" at line 2 lack positive antecedent support in claim 9.

***Suggested Claim Language***

5. In claim 9, at line 5, it is suggested that the term "multi elements" be changed to "multiple elements".

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 9, 12, 14, and 15 are rejected under 35 U.S.C. 102(b) as anticipated by Nakajima et al (U.S. Patent Application Publication US 2002/0139416).

Nakajima et al prepares a multi-element polycrystal, such as one containing Si and Ge, or one containing Ga, In and As in instant claim 9, by a method comprising preparing a melt containing multi elements; and cooling the melt while controlling a cooling rate to obtain a multi-element polycrystal (see paragraphs 0027, 0033, 0034; and claims 12 and 13. The composition of the melt is controlled since one selects the

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amounts of elements to be melted (see paragraph 0033). The resulting multi-element polycrystal has the instant discrete regions dispersed in a matrix (see Figures 2A to 2D; and paragraphs 0022 to 0028).

With respect to claim 12, there is no parameter X in parent claim 9. Accordingly, since claim 9 is anticipated, so is claim 12.

With respect to claim 14, the elements of the polycrystal can be Ga, In, and As (see claim 10).

With respect to claim 15, a solar cell is manufactured (see paragraphs 0014, 0019, and 0039).

Since Nakajima et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

***Claim Rejections - 35 USC § 102/103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1, 2, 4, 5, 10, and 11 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nakajima et al (U.S. Patent Application Publication US 2002/0139416).

With respect to claims 1 and 2, Nakajima et al prepares the instant multi-element polycrystal of  $\text{Si}_{1-x}\text{Ge}_x$  having the instant discrete regions dispersed in a matrix (see paragraphs 0009 to 0021, 0031, 0033, and 0034; and Figures 1A to 1D and 2A to 2D).

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In particular, it is the Examiner's position that the instant multi-element polycrystals prepared according to the procedure and cooling rate in paragraphs 0033 and 0034 and resultant microscopic distributions in Figures 1A to 1D and textures seen in respective Figures 2A to 2D inherently meet the claimed limitation that  $X_1 < X < X_2$ .

With respect to claim 4, the crystal grains are columnar shape (see Figures 2A to 2D where there are discrete regions three dimensionally dispersed in a matrix (see Figures 2A to 2D). It is the Examiner's position that the matrices in Nakajima et al's Figures 2A to 2D have strain.

With respect to claim 5, a solar cell is manufactured (see paragraphs 0014, 0019, and 0039).

With respect to claims 10 and 11, Nakajima et al prepares said multi-element polycrystal,  $\text{Si}_{1-x}\text{Ge}_x$  by a method comprising preparing a melt containing multi elements; and cooling the melt while controlling a cooling rate melt to obtain a multi-element polycrystal (see paragraphs 0027, 0033, 0034; and claims 12 and 13. The composition of the melt is controlled since one selects the amounts of elements to be melted (see paragraph 0033). The resulting multi-element polycrystal has the instant discrete regions dispersed in a matrix (see Figures 2A to 2D; and paragraphs 0022 to 0028). As noted above, it is the Examiner's position that the instant multi-element polycrystals prepared according to the procedure with the cooling rate in paragraphs 0033 and 0034 and resultant microscopic distributions in Figures 1A to 1D and textures seen in respective Figures 2A to 2D inherently meet the claimed limitation that  $X_1 < X < X_2$ .

Since Nakajima et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition the instant requirement that  $X_1 < X < X_2$  and the instant strain would obviously have been present once the multi-element polycrystals prepared according to the procedure in Nakajima et al's paragraph 0033 and 0034 and resultant microscopic distributions in Figures 1A to 1D and textures seen in respective Figures 2A to 2D are prepared. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

***Claim Rejections - 35 USC § 103***

10. Claims 3, 6-9, and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al (U.S. Patent Application Publication US 2002/0139416).

With respect to claim 3, Nakajima et al prepares the instant multi-element polycrystal of  $\text{Si}_{1-x}\text{Ge}_x$  having the instant discrete regions dispersed in a matrix (see paragraphs 0009 to 0021, 0031, 0033, and 0034; and Figures 1A to 1D and 2A to 2D). In particular, it is the Examiner's position that the instant multi-element polycrystals prepared with the cooling rates according to the procedure in paragraphs 0033 and 0034 and resultant microscopic distributions in Figures 1A to 1D and textures seen in respective Figures 2A to 2D inherently meet the claimed limitation that  $X_1 < X < X_2$ . Nakajima et al's parameter M, which corresponds to the X in instant claim 3, has the value  $0 \leq M \leq 1$  (see paragraph 0010).



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With respect to claims 6 and 7, the polycrystal can be  $\text{In}_{1-N}\text{Ga}_N\text{As}$ , where Nakajima et al's parameter N corresponds to the instant X (see claims 9 and 10). Thus, for example, when N is 0.5, just as M is 0.5 for the example in Nakajima et al's paragraph 0033 for SiGe, it is the Examiner's position that that the instant  $X_1 < X < X_2$  will be met, just as it is met for the SiGe.

With respect to claim 8, a solar cell is manufactured (see paragraphs 0014, 0019, and 0039).

With respect to claim 9, Nakajima et al prepares a multi-element polycrystal, such as one containing Si and Ge, or one containing Ga, In and As in instant claim 9, by a method comprising preparing a melt containing multi elements; and cooling the melt while controlling a cooling rate melt to obtain a multi-element polycrystal (see paragraphs 0027, 0033, 0034; and claims 12 and 13. The composition of the melt is controlled since one selects the amounts of elements to be melted (see paragraph 0033). The resulting multi-elements polycrystal has the instant discrete regions dispersed in a matrix (see Figures 2A to 2D; and paragraphs 0022 to 0028).

With respect to claim 12, there is no parameter X in parent claim 9. In any event, Nakajima et al's parameter M, which corresponds to the X in instant claim 3, has the value  $0 \leq M \leq 1$  (see paragraph 0010).

With respect to claims 13 and 14, the polycrystal can be  $\text{In}_{1-N}\text{Ga}_N\text{As}$ , where Nakajima et al's parameter N corresponds to the instant X (see claims 9 and 10). Thus, for example, when N is 0.5, just as M is 0.5 for the example in Nakajima et al's

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paragraph 0033 for SiGe, it is the Examiner's position that that the instant  $X1 < X < X2$  will be met, just as it is met for the SiGe.

With respect to claim 15, a solar cell is manufactured (see paragraphs 0014, 0019, and 0039).

Nakajima et al teaches the limitations of the instant claims other than the differences which are discussed below.

With respect to claims 3 and 12, Nakajima et al does not specifically prepare its  $Si_{1-M}Ge_M$  polycrystal with  $M \leq 0.1$ . However, as noted above, Nakajima et al's parameter M, which corresponds to the X in instant claim 3, has the value  $0 \leq M \leq 1$  (see paragraph 0010 of Nakajima et al). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Nakajima et al's polycrystal  $Si_{1-M}Ge_M$  such that  $M \leq 0.1$  because Nakajima et al teaches that  $0 \leq M \leq 1$ , and a value of  $M \leq 0.1$  is clearly within the range disclosed by Nakajima et al. The disclosed range of  $0 \leq M \leq 1$  is limited enough so that the selection of  $M \leq 0.1$  is within the skill of an artisan practicing Nakajima et al's invention.

With respect to claims 6-8 and 13, Nakajima et al does not specifically require the instant  $X1 < X < X2$  for its  $In_{1-N}Ga_NAs$ . However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Nakajima et al's  $In_{1-N}Ga_NAs$  such that N is, for example 0.5, because such is clearly within the scope of Nakajima et al's disclosure in view of the use of M of 0.5 of  $Si_{1-M}Ge_M$  (see paragraph 0033; and Figures 2a to 2D). It is the Examiner's position that that the instant  $X1 < X < X2$  will be met when N is 0.5 just as it is met when M is 0.5. Indeed, it is

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the Examiner's position that practically any value of M or N for Nakajima et al's polycrystals will result in the instant  $X1 < X < X2$ . This is based on the fact that Nakajima et al uses practically the same method of preparation and elements as here claimed.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond  
Primary Examiner  
Art Unit 1753

Alan Diamond  
July 13, 2005

A handwritten signature in black ink, appearing to read 'Alan Diamond', with a horizontal line extending to the right.